

****FULL TITLE****

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The luminosity function of galaxies in elliptical-dominated galaxy groups: clues on the nature of fossil groups

R. Lopes de Oliveira¹, C. Mendes de Oliveira¹, R. Dupke², L. Sodré¹, E. Cypriano¹

1-Universidade de São Paulo, Brazil; 2-Observatório Nacional, Brazil

Abstract. We have started a study of luminosity functions of Fossil Group candidates in order to characterize the faint-end of their galaxy distribution. Here we report on results of nine of them from SDSS photometry and spectroscopy.

Groups of galaxies optically dominated by an elliptical galaxy are classified as Fossil Groups (FGs) if the gap in magnitude between the two brightest galaxies within $R_{\text{virial}}/2$ is greater than 2 in the r -band, and $L_X > 10^{42} h_{50}^{-2} \text{ erg s}^{-1}$. We investigated the luminosity functions (LFs) of 9 elliptical-dominated galaxy groups which are candidates to FGs from SDSS photometry ($0.09 < z < 0.15$): J115305.32+675351.5, J104548.50+042032.5, J100742.53+380046.6, J141004.19+414520.8, J085640.72+055347.3, J081526.59+395935.5, J101745.57+015645.8, J153950.78+304303.9, and J171811.93+563956.1 (Koester et al. 2007; Santos et al. 2007). The main results are: (i) A Schechter function describes well the individual LFs, with an α -parameter ranging from -1.5 to 0.5; two Schechter functions are needed to describe the composite LF, which is characterized by a decrease in number of galaxies around $-20 < R < -18.5$. (ii) There is evidence of merging of the brightest galaxies for a given group, given that Δr -mag, i.e. the difference in magnitudes between the M^* and the mean absolute magnitude computed from the brightest galaxy of all groups is ~ 3 (Δg -mag ~ 2.3 and Δi -mag ~ 3). (iii) We derive that the faint-end of the composite LF is well fit by $\alpha > -1.13$ in the r -band, and > -0.8 for the g and i bands. These are comparable within errors to parameters derived for the LF of “normal” groups. From the available SDSS spectroscopic redshifts and using the Carlberg et al. (1997) relation, we estimate $0.7 < R_{\text{virial}}(\text{Mpc}) < 1.3$ for the groups, with a mean value of ~ 1 Mpc, which corresponds from the SIS model to $4 \times 10^{13} < M_{\text{virial}}(M_{\odot}) < 2.3 \times 10^{14}$. Future comparisons of the LF of other systems with that of FGs, determined from a larger sample will provide insights into the nature of these systems.

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